



# Cooling Work Package

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- Reiterate resource requirements
  - Either list post doc, where post doc effort is sufficient
    - I don't include supervision
  - Or list staff, where specialist (engineering) effort is required
  - Students can support post doc effort
    - I guess ratio of 3:1, of course depends on the student
- Add in indicative “funding/interest status”

| Task                              | Staff [pm] | postdoc [pm] | student [pm] | Cash [kEUR] | Comment                                 |
|-----------------------------------|------------|--------------|--------------|-------------|---|
| 6D cooling baseline               |            | 36           |              |             | Plausible funding scenario              |
| 6D cooling optimisation           |            | 36           |              |             |   |
| Final cooling - solenoid          |            | 48           |              |             | Funding ~ in place                      |
| Final cooling - PIC               |            | 24           |              |             | Interested party                        |
| Final cooling - frictional        |            | 12           |              |             | Interested party                        |
| Final cooling – emittance exch    |            | 24           |              |             |   |
| Final cooling – rectilinear       |            | 24           |              |             | Interested party                        |
| Target yield calculation          |            | 12           |              |             | Interested party                        |
| Target and chicane optimisation   |            | 24           |              |             |   |
| Charge separation design          |            | 24           |              |             |   |
| Bunch merge optimisation          |            | 24           |              |             |   |
| Material physics issues           |            | 24           |              |             |   |
| Collective effects - sim          |            | 24           |              |             |   |
| Collective effects – expmt design |            | 24           |              |             |   |
| Alignment and tolerances          |            | 24           |              |             |   |
| Absorber design                   | 24         |              |              |             | If LH2 absorber is desired              |
| Engineering integration           | 24         |              |              |             | First pass on a couple of cooling cells |
| Computing                         | 12         |              |              | Cluster     |   |

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|---------------------------------|------------|--------------|--------------|-----------------|----------------------------|
| Target shielding and heat load  | 24         |              |              |                 | Plausible funding scenario |
| Target shielding cooling system | 24         |              |              |                 | Plausible funding scenario |
| Graphite target design          |            | 36           |              |                 | Plausible funding scenario |
| Liquid metal target design      |            | 36           |              |                 |                            |
| Titanium ball tgt design        |            | funded       |              |                 | Funded – ongoing study     |
| Fluidised Tungsten tgt design   |            | 36           |              |                 | Plausible funding scenario |
| Horn performance studies        | 36         |              |              |                 | Interested party           |
| Remote handling studies         | 24         |              |              |                 |                            |
| Hardware prototyping            |            |              |              | 50k-100 kCHF pa |                            |
| HiRadMat/equivalent studies     |            |              |              | 600 kCHF        |                            |
| Full power test – ESS study     |            |              |              |                 | Preliminary design studies |
| Full power test – CERN study    |            |              |              |                 | Preliminary design studies |

